Saskatchewan's Mineral Resources
Lesson: Sizing and Separation of Mixtures

Overview
Students will separate mixtures by using a set of sieves or materials similar to sieves.

Duration: One class

Materials:
- Jars with lids
- Instant coffee
- some beans
- instant rice
- a large can with a lid
- a supply of fairly large ball bearings (about 1 cm in diameter)
- sieves of different sizes, colanders, mesh, filter paper
- water
- some small rocks (~ 2 cm in diameter)
- some pebbles (~ 1 cm)
- sand and soil.

Instructional Methods: Inquiry, lab activity, discussion


Source: Wikipedia

Learning Outcomes and Indicators

Grade 7: Mixtures and Solutions:
MS7.1Distinguish between pure substances and mixtures (mechanical mixtures and solutions) using the particle model of matter.
a. Examine a variety of objects and materials, and record qualitative (e.g., colour, texture, and state of matter) and quantitative (e.g., density, melting point, and freezing point) physical properties of those objects in a chart or data table.

MS7.2Investigate methods of separating the components of mechanical mixtures and solutions, and analyze the impact of industrial and agricultural applications of those methods.
a. Describe methods used to separate the components of mechanical mixtures and solutions, including mechanical sorting, filtration, evaporation, distillation, magnetism, and chromatography.
d. Design and conduct an experiment to determine the effectiveness and/or efficiency of one or more methods of separating mechanical mixtures and solutions.
e. Report the strengths and limitations of a chosen experimental design to determine the effectiveness and/or efficiency of one or more methods of separating mechanical mixtures and solutions.

Source: Saskatchewan Evergreen Curriculum

Big Picture Question

1. How do you extract the valuable minerals from the rock?

Background Information

A number of methods have been developed to separate particles or components from the ores

they are found in. These would include the processes of crushing, screening and grinding. Some mixtures can be separated by a series of screens. This activity will demonstrate how screening and crushing might be used in a milling complex. It might be useful to find or review definitions of the following terms before starting this activity: mixtures, ore, mineral.

THE ACTIVITY

(Independent learning, Guided Inquiry, Discussion)

Students to work in pairs or small groups.

1. Mix about ½ cup each of the beans, coffee and rice.
2. Pass this mixture through the set of sieves.
3. Place the rice into the large can along with the ball bearings. Place the can on its side and roll to grind the rice finer.
4. Pass this mixture through the set of sieves.
5. Mix the ground rice and the coffee together.
6. Develop ideas that will help you to separate the coffee from the rice.
7. Develop a plan and proceed with the separation of the coffee from the rice.

Assessment Method and Evidence

✓ **Separation Activity**

- The students will describe the characteristic of the mechanical mixture.
- The students will examine and record the physical properties of the beans, rice and coffee, and decide upon the property(s) of each material that will allow them to separate it from the rest of the mixture (grain size).
- Students will develop a plan describing the methods they will use to separate the various components of the mechanical mixture.
- Students will use a problem-solving process to design, construct, and evaluate a prototype of a process or device for separating a mechanical mixture.

Extension

1. Research the process used at one of the mines in Saskatchewan.

Resources

Saskatchewan Mining Association: Education/Outreach Activities. Available at: http://www.saskmining.ca/index.php/info/Education-Outreach/schoolprojects-mixtures.html

Name: _____

Student Activity

1. Mix about ½ cup each of the beans, coffee and rice.
   Describe this mixture. What type of mixture is it?

2. Separate this mixture. Explain the properties of the beans, coffee and rice that will enable you to separate each from the other.

PLAN:

RESULTS:

3. Place the rice into the large can along with the ball bearings. Place the can on its side and roll to grind the rice finer.

4. Pass this mixture through the set of sieves to remove the ball bearings.
   What is the result?

5. Mix the ground rice and the coffee together.

6. Develop a plan that will help you to separate the coffee from the rice. Explain the properties of the beans, coffee and rice that will enable you to separate each from the other.

   PLAN:

7. Proceed with the separation of the coffee from the rice.
   RESULTS: